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THE INFLUENCE OF GOOD FARM ORGANIZATION IN COSTS OF PRODUCTION.

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Good organization in farming, as in any other business, has an important influence on costs of production and profits. While it is difficult to separate definitely the influence of good organization from the influence of good operations and other factors, it is nevertheless possible to show how good organization affects production and to measure with reasonable accuracy its influence on costs.

In attempting to determine the influence of good farm organization on production and costs, we can perhaps get a clearer idea of the problem if we study it from the standpoint of the three principal divisions into which farm organization somewhat logically divides itself; *i.e.,* financial or economic organization, physical organization and productive organization.

The financial or economic organization of a farming business is concerned mainly with the problem of determining the minimum size of business which is well adapted to the type of farming to be carried on, and to work out the most profitable distribution of the investment in various items such as land, buildings, machinery and tools, horses and other live stock.

It is evident that if production is to be carried on most effectively, that the various items of investment must be utilized to the fullest extent consistent with the maximum returns for the farm business as a whole. Thus, if the farm is too small the amount invested in buildings, machinery and horses will be disproportionately high. Small buildings are relatively more expensive than larger ones per unit of space for housing live stock, storing feed, or sheltering machinery. A complete outfit of farm machinery needed for the successful operation of a farm in any given region will be adequate for a certain sized farm. This may range for ordinary types of farming from 100 to 200 acres. If the farm is not large enough to utilize fully a complete outfit of such machinery of standard size the costs for this item must be relatively higher than for those farms large enough to make a full use of a complete outfit of standard sized equipment.

In connection with the study of the best adjustment of buildings and machinery equipment, it is important to note that the carrying charge on these items is relatively high and it is therefore important to keep the investment as low as possible consistent with efficient operations. For example, the investment in farm buildings exclusive of the farmer's residence which is a personal item, often varies from $10 to $25 per acre for the same general types of farming carried on under very similar conditions. Apparently both of these classes of farmers have adequate buildings to furnish satisfactory shelter for stock, to store feed, and to house their machinery. If we assume a carrying charge of 15 per cent. a year for interest, depreciation, upkeep, taxes and insurance, for the general run of farm buildings we should have the following results: For a farm with an investment of $10 per acre the total carrying charge would be $1.50 per acre per year. For a farm with an investment of $25 per acre the carrying charge would be $3.75 per acre per year. That is, we should have a difference in the carrying charge, or the cost of production per acre, due to this one item alone, of $2.25 per acre per year.

In the case of machinery the carrying charge is still higher. If we include interest, shelter, taxes, upkeep and depreciation the carrying cost of farm machinery ranges from 25 to 35 per cent. per year. Naturally upkeep and depreciation will be somewhat in proportion to the amount of use, but machinery wears out some, "just by standing around," and also depreciates through obsolescence as well as use. Investments in farm machinery—exclusive of tractors—range from $5 to $10 per acre, throughout the corn belt section. If we assume a carrying charge of 20 per cent. to 25 per cent., these differences in the investments in machinery per acre, would mean a difference in the carrying charge, or the cost of production per acre, of from $1.00 to $1.25.

Cost accounting investigations in Illinois show that such differences in the cost of production due to differences in the investments in both buildings and machinery equipment actually occur on somewhat representative farms.

If we study the physical organization of the farm from the standpoint of its influence on production and costs, we find that it has an important bearing on the problem, particularly from the standpoint of economic operation. In working out the plan for the best physical organization of a farm, we find that the problem divides itself somewhat logically into two parts: *i.e.*, the organization of the farm as a whole, including the location of the farmstead and the general layout of the field system; and the more detailed planning of the farmstead including the location and arrangement of yards, paddocks, lanes and buildings.

In planning the organization of the farm as a whole the following are perhaps the chief considerations to be kept in mind. The farmstead should in general be so located as to reduce to the minimum the distance between the fields and the farmstead. This applies especially to those fields which are regularly brought into the rotation, and which therefore require the greatest expenditure of time traveling back and forth in raising crops, in hauling crops to the farmstead, and in hauling manure from the farmstead to the fields.

Naturally the average distance to the fields will be determined to some extent by their general shape and arrangement. Ordinarily we should not like to locate the farmstead in the center of the field system where this necessitates having it a long distance from the public road. A good general rule to follow would be to locate the farmstead on the public road as near the center of the field system as possible. Small lots and minor rotation used for growing green forage crops, for hogs and sheep, *e.g.*, should be located near the farmstead to save time in caring for such stock.

In planning the field systems for the major rotation three principal aims are to be kept in mind. (1) There should be as many fields, of as nearly equal size as possible, as there are years in the rotation. (2) Fields should be as large as practicable. Large fields save time in doing farm work and reduce the cost of fencing. (3) Fields should be rectangular if possible, and should be about twice as long as they are wide as a general rule. This makes for convenience and economy in performing the various field operations. Rectangular fields are also more easily and economically fenced than irregular ones.

While many farms present difficulties in the physical organization of their field system which cannot be overcome, one need only to study somewhat casually the organization of farms in going about the country to be convinced that the majority of such farms offer opportunity for improvement along this line. The University of Minnesota College of Agriculture[1] reports that in the re-planning of a 160-acre farm, the average distance from the farmstead to the fields was reduced from 70 to 24 rods, and the amount of inside fencing required from 892 to 640 rods. Illustrations of this kind could be multiplied indefinitely.

We can only touch briefly here on the question of the physical organization of the farmstead. This problem is relatively more important on farms producing live stock than on those devoted mainly to crop farming. The entire question of handling live stock with the minimum expenditure of man and horse labor presents opportunities for very important economies. All yards, paddocks, pastures and lanes should be so laid out as to make for the greatest convenience in moving animals from one place to another about the farmstead or between the farmstead and the farm fields.

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[1] Minnesota Bulletin, No. 125, p. 34.

The location and arrangement of barns, stables, feed storage and general feeding equipment should be so planned as to reduce the man and horse labor required to the minimum. While we have only begun to study these questions somewhat systematically, we already have numerous illustrations of very material labor economies which have been effected through good organization of the physical plant used in producing live stock. Other and more careful studies need still to be made, in order to give us more exact figures regarding the reduction in costs which can be effected in this direction.

Important as are the economies which can be effected through the best financial and physical organization of the farm, it is probable that on a large majority of farms even greater economies can be effected through the more scientific organization of their productive enterprises, *i.e.*, through their productive organizations.

In the organization of the crop and animal enterprises of the large majority of farms with a view to establishing the most profitable and permanent systems of farming, a number of complex and interrelated factors must be taken into consideration. Most important among these, regardless of the order of their importance, would perhaps be the following: The maintenance of the fertility of the soil; the most advantageous marketing of all crop material produced; the best utilization of the man and horse labor used; and the insurance against crop failures, price fluctuations, and other unfavorable conditions by means of a reasonable degree of diversity in producing both crops and animals.

In studying costs of production in agriculture the expense of soil replacement has been almost entirely overlooked. This has been due largely to the fact that farming land has been constantly advancing in selling value, in spite of the fact that it has been almost everywhere gradually decreasing in productive capacity. While it is evident from the economic standpoint that the agriculture of almost every new region must of necessity be extractive, it is equally evident that at some stage in the development of such new regions the point of diminishing returns must be reached. That is, sooner or later it will pay the operator of such lands better to begin improving or at least maintaining this fertility, rather than to go on farming them extractively. Just when this point is reached it is naturally difficult to tell. It is safe to assume, however, that a great many farmers do not make such changes in their systems of crop production and soil maintenance nearly so early as economic conditions warrant. It is evident both from the standpoint of sound accounting as well as a good farming procedure that the problem of soil replacement must now be taken into consideration in all of the older agricultural regions of the United States in attempting to determine costs of production and profits in farming.

In the working out of this problem several factors must be considered. First, that for general farming the growing of legume crops offers the most economic source of nitrogen, and that the rotation should include the proportion of legume crops necessary to maintain or increase the nitrogen in the soil. Second, that in systems of farming where the crops grown are fed to live stock, and the manure is carefully handled, from 60 to 70 per cent. of the nitrogen, from 75 to 80 per cent. of the phosphorus and from 80 to 85 per cent. of the potassium contained in the crops fed can be returned to the soil. And third, that insofar as the mineral elements in the soil are limiting crop production they should be added in such form and in such amounts as will contribute most to the profits of the entire farm business.

In organizing the productive enterprises of the farm so as to provide the most advantageous market for all of the crop material produced, live stock plays an important part. Regular markets frequently offer very little for damaged grains and other crops, even though they may have almost full feeding value as compared with crops of the best quality.

Much low grade and otherwise waste crop material can be converted into the best quality of live stock products. In fact, a considerable proportion of all crop material produced in a good system of farming has little or no market value. Such low grade and unsalable products can, however, be converted into live stock products by feeding them in connection with the salable crops grown, nearly all of which must in the end be fed to live stock to find a market. By keeping some live stock on all farms growing ordinary crops, it is possible to market advantageously not only the salable portion of the crops grown but also the unsalable and waste portions.

This factor alone eliminates much waste and helps to increase profits without increasing the cost of producing animals and animal products.

In practically all types of ordinary farming man and horse labor make up from 75 per cent. to 85 per cent. of the total operating expense. A good rotation of crops and the production of two or more kinds of live stock make possible the most even distribution of labor throughout the year. An even distribution of horse labor means that the horses carried can do more work during the year, or that a given amount of work can be performed by a smaller number of horses. Actual cost accounting results on Illinois farms show wide variations in the cost of horse labor. The variations found are frequently responsible for differences of from $1 to $4 per acre in the cost of producing ordinary crops, such as corn, oats, wheat and hay. In just how far these differences are due to good farm organization and in how far they are due good farm operation and other factors it is important to be able to say with considerable exactness. It is plain, however, that they are due mainly to the more efficient organization of the productive enterprises, *i.e.*, the crop rotations and the systems of animal production followed.

The more even distribution of man labor throughout the year, as a result of the best organization of the crop and animal enterprises, makes it possible to find productive employment for practically all of the man labor required at the peak load period. This means that relatively little extra man labor need be hired when labor is scarcest and when wages are therefore highest. It also means that a better grade of man labor can be secured. The best farm laborers will not be contented with a job which does not provide employment throughout the entire year.

Most farmers are working on more or less limited capital. This makes it especially desirable that they organize their productive enterprises in such a way as to offer the largest measure of insurance against crop failure, price fluctuations and other unfavorable conditions. This can be done best by growing several crops well adapted to the region, and by marketing these crops through two or more classes of live stock. In most sections it is also desirable to have at least one cash crop. When several crops having somewhat different seasonal requirements are grown, there is little danger that all will be poor during any one year. When the crops grown are marketed through two or more classes of live stock, the farmer has more choice as to what class of stock he will use in marketing his feed. This is especially true when he does not overstock on animals and when he keeps his animal enterprises as flexible as possible. Such flexibility in the live stock enterprise is secured mainly by carrying at least one class of animals which can be reduced or increased somewhat from one year to another without too serious disadvantages. Poultry, swine and sheep represent good illustrations of flexible animal enterprises. Horses, dairy cows and beef cows represent the more inflexible forms of animal production. The more flexible or adaptable the system of crops and animal production, the greater measure of insurance will the farmer have against poor crops, violent fluctuations in prices and other unavoidable conditions.

Efficient farming consists mainly in so adjusting the financial, physical and productive organization of the farm as to return the maximum profits for the entire business over a series of years. Each enterprise must be studied from the standpoint of its influence on the business as a whole.